

Assessing the impact of smoking cessation services on reducing health inequalities in England: observational study

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Objective: NHS stop smoking services are expected to play a key part in achieving the infant mortality and life expectancy health inequality targets in England by reducing smoking prevalence in deprived areas. This paper assesses the extent to which services have made a contribution to reducing inequalities in smoking between 2003–4 and 2005–6.

Methods: Synthetic estimates of baseline smoking prevalence data were compared with national monitoring data about the numbers of smokers in receipt of services and the proportion who self report quitting at four weeks. The social distribution of service recipients and quitters was compared with estimates of smoking prevalence to assess impact on inequalities. Comparisons were made between officially designated disadvantaged areas (the Spearhead Group) and others.

Results: Short-term cessation rates were lower in disadvantaged areas (52.6%) than elsewhere (57.9%) ($p < 0.001$), but the proportion of smokers being treated was higher (16.7% compared with 13.4%) ($p < 0.001$). The net effect was that a higher proportion of smokers in the most disadvantaged areas reported success (8.8%) than in more advantaged areas (7.8%) ($p < 0.001$). Using the evidence-based assumption that three-quarters of short-term quitters will relapse within one year, the absolute and relative rate gaps in smoking prevalence between Spearhead areas and others are estimated to fall by small but statistically significant amounts from 5.2 and 1.215 (CIs: 1.216 to 1.213) to 5.0 and 1.212 (CIs: 1.213 to 1.210) between 2003–4 and 2005–6.

Conclusion: NHS stop smoking services have probably made a modest contribution to reducing inequalities in smoking prevalence. To achieve government targets, however, requires both the development of more innovative cessation interventions for the most addicted smokers and action to ensure that other aspects of tobacco control policy make a larger contribution to inequality goals.

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Reducing inequalities is a central objective of English health policy.¹ But despite a decade of concerted effort the health divide is widening in relative terms.² Part of the explanation for the lack of progress is that convincing evidence about effective interventions to reduce inequalities is in short supply.³ Nevertheless, there is a growing recognition that inequalities in smoking are the largest single contributor to those inequalities in health⁴ (such as life expectancy and infant mortality) that are of greatest policy concern in England.⁵ This paper aims to contribute to filling a major gap in the evidence base by investigating the potential for NHS stop smoking services to reduce health inequalities.

Smoking cessation services were established in the United Kingdom following the publication of the tobacco white paper "Smoking Kills,"⁶ to be delivered by the NHS.⁷ From their inception, the services were intended to focus on particular groups, including young people, pregnant women and, in particular, economically disadvantaged smokers. An early indication of this focus on inequality was that the first allocation of funds was provided to some of the most deprived areas in England, health action zones (HAZs).⁸ Following the development of services in HAZs in 1999, the services were rolled out to other parts of the United Kingdom from 2000. Guidance was issued to all new services that emphasised the importance of treating priority groups, in particular disadvantaged smokers.⁹

HAZs and, later, health authorities in all parts of the country were required to build on the evidence base, outlined in a review published in the journal *Thorax* in 1998 and updated in 2000.^{10–11} Smoking cessation treatment was defined as including behavioural interventions such as brief advice, counselling

and intensive support plus the administration of effective pharmacotherapies, specifically nicotine replacement therapy (NRT) and bupropion. The early guidance described the effectiveness of brief advice (delivered by healthcare professionals as part of routine practice) but the new cessation monies were intended to fund more intensive services. These were to include specialist groups- of the kind developed by the Maudsley clinic in London,¹² as well as services often based in primary care and delivered on a one-to-one basis.¹³

The impact of smoking cessation services is being assessed in a number of different ways. Services were required from the outset to collect a minimum dataset and report their results on a quarterly basis to the Department of Health. However, this routine monitoring provides no direct information to help assess progress towards reducing smoking-related inequalities. The Department of Health also commissioned a national evaluation of smoking cessation services. This study took place between 2000 and 2004 and reported in 2005.¹³ It described the process of service development and evaluated short-term (four-week) and longer term (52-week) outcomes as well as assessing the effectiveness of services in reaching disadvantaged smokers.^{14–16}

Two national surveys of smoking cessation coordinators in England were carried out (in 2001 and 2002) to assess key elements of service development, including the strategies employed to target disadvantaged smokers.¹⁷ Almost all services (92%) were using primary care venues in deprived areas; 70%

Abbreviations: ARG, absolute rate gaps; CO, cumulative outcome; HAZs, health action zones; IMD, Index of Multiple Deprivation; NRT, nicotine replacement therapy; RR, relative rate ratios

were also locating services in secondary care and non-healthcare settings in deprived areas (69%). Efforts were also made (71%) to publicise smoking cessation in disadvantaged communities. A number of services were also training volunteers or community workers as advisers (49%), an approach that later research was to find was an effective strategy in treating disadvantaged smokers.¹⁴

The national evaluation of smoking cessation also assessed the extent to which services in 19 (former health authority) areas were reaching disadvantaged smokers and supporting them to set a quit date. The research found that in all areas there was evidence of “positive discrimination,” meaning that services were effectively reaching a higher proportion of smokers living in the most disadvantaged areas compared with more affluent areas.¹⁶ Other studies have identified the same pattern in several different parts of England.^{18–20} This suggests that to some extent NHS stop smoking services are reversing the “inverse care law,” which states that the availability of health services varies inversely with population health needs.²¹

Between their establishment in 1999 and 2006, over two million quit attempts have been made with support from NHS stop smoking services.^{22–23} However, these attempts still represent a small proportion of those who try to stop smoking in the United Kingdom every year. Indeed, the latest research suggests that, although just under half (46%) of smokers try to quit each year, only 5% of quit attempts involve the use of NHS stop smoking services.²⁴

Despite this relatively limited reach, health policy in England now includes a very explicit assumption that smoking cessation services should make a significant contribution to reducing health inequalities in relation to the headline targets associated with life expectancy and infant mortality.⁹ The aim of this paper is to assess whether treatment services do have a realistic role to play in reducing inequalities in smoking prevalence that might contribute to achieving the headline health inequality targets in England, and to estimate the size of any beneficial impact. It uses small area estimates of smoking prevalence and national

monitoring data for NHS stop smoking services to compare changes over time between relatively advantaged and disadvantaged areas in England. For these purposes, the focus of policy attention is increasingly on a set of disadvantaged local authority areas collectively known as the Spearhead Group that accounts for about 30% of the adult population.

The Spearhead Group is made up of 70 local authorities—and 88 NHS primary care trusts (before the reorganisation of October 2006) that map to them—based upon those that are in the bottom fifth nationally for three or more of the following five indicators:

- male life expectancy at birth
- female life expectancy at birth
- cancer mortality rate in under 75s
- circulatory disease mortality rate in under 75s
- index of multiple deprivation 2004 (IMD) (Local Authority Summary), average score (see box).

This paper is predicated on a number of assumptions. The first is that health inequalities can be expressed in terms of the average experiences of people living in areas with different levels of disadvantage. Indeed this is a central feature of health policy in all parts of the United Kingdom.^{1–25–27} The second is that reducing inequalities in smoking will make a substantial contribution to reducing inequalities in life expectancy and infant mortality that are major goals of health policy in England. Finally, if evidence can be found that smoking cessation services are helping proportionately more smokers to quit in Spearhead areas than in other parts of England, then this constitutes *prima facie* evidence of a contribution to reducing health inequalities.

METHODS

Small area synthetic estimates of smoking prevalence rates for electoral wards in 2000–2 aggregated to the level of primary care trusts were obtained from the Office for National Statistics neighbourhood statistics website.²⁸ All other data about the relative sizes of adult populations, the numbers of people treated by smoking cessation services and the numbers who self reported quitting at four-week follow up were obtained from annual statistical reports produced by the Department of Health.^{29–31} Population data were derived from resident population mid-2003 figures based on the 2001 census counts provided by the Office for National Statistics in April 2004 and reported in statistical bulletins on NHS stop smoking services.²⁹ Monitoring of the NHS stop smoking services is carried out through quarterly monitoring returns as set out in guidance issued in 2001.³²

Key indicators employed in this study are the estimated numbers and proportions of smokers who receive treatment services and self report quitting at four-week follow up together with estimates of the cessation rate in the Spearhead Group and other areas. The statistical significance of differences between areas is shown using Pearson's χ^2 test. Simple measures of health inequality are calculated in terms of absolute rate gaps and relative rate ratios (with 95% confidence intervals) between the Spearhead Group on the one hand and non-Spearhead areas and England as a whole.

The estimated smoking prevalence rate for primary care trusts was applied to adult population sizes to estimate the actual numbers of smokers in each area in 2003. These data were then aggregated to produce 2003 baseline estimates of the numbers of smokers in Spearhead Group and other areas. These statistics were combined with national monitoring data to obtain estimates of the proportion of smokers treated and successfully quitting at four weeks in Spearhead

Index of multiple deprivation

- The index of multiple deprivation 2004 (IMD 2004) is a measure of multiple deprivation at the small area level.
- The IMD 2004 contains seven domains of deprivation:
 - income deprivation,
 - employment deprivation,
 - health deprivation and disability,
 - education,
 - skills and training deprivation,
 - barriers to housing and services,
 - living environment deprivation and crime.
- Each domain contains a number of indicators. The criteria for inclusion of these indicators are that they should be “domain specific” and appropriate for the purpose (as direct as possible measures of that form of deprivation); measuring major features of that deprivation (not conditions just experienced by a very small number of people or areas); up to date; capable of being updated on a regular basis; statistically robust; and available for the whole of England at a small area level in a consistent form. <http://www.communities.gov.uk/index.asp?id=1128444>

Table 1 Inequalities in smoking, England, 2003

	Adult population*	Estimated no of smokers†	Estimated prevalence rate
Spearhead	12 304 019	3 591 063	29.186
Non-Spearhead	27 748 222	6 666 133	24.024
England	40 052 236	10 257 196	25.610

*Population data are derived from resident population mid-2003 figures based on the 2001 census counts provided by the Office for National Statistics in April 2004 as used in "Statistics on NHS stop smoking services in England, April 2004 to March 2005," Statistical Bulletin 2005/03/HSCIC, NHS Health and Social Care Information Centre, Lifestyles Statistics, Table 19 and Annex B para 4.

†Derived from statistics on NHS stop smoking services in England.²²⁻²⁴

and non-Spearhead areas. Estimates of the impact of services on prevalence rates were obtained by deducting estimates of the numbers of smokers successfully quitting at four weeks and by applying a more realistic estimate of probable one year success rates based on a detailed analysis of 52-week cumulative outcome (CO) validated follow up,¹⁵ which reported that approximately three-quarters of short term quitters relapse within one year.

Reanalysis of data obtained from Ferguson *et al* suggests that relapse rates may be higher 30% disadvantaged areas comprising approximately 30% of the population (broadly equivalent to the Spearhead Group), but the rates are not statistically significantly different between smokers living in the most disadvantaged three deciles of the distribution (74.6%: 95% CIs 67.4 to 81.8) and other parts of England (71.3%: 95% CIs 57.7 to 84.8). As a result, we assume an average relapse rate of 75% for both Spearhead and non-Spearhead areas.

RESULTS

Table 1 provides baseline information for 2003 about the relative size of the adult population in Spearhead and non-Spearhead areas together with synthetically estimated data about smoking prevalence rates from which the total number of smokers are derived. Approximately 30% of the adult population of England lived in Spearhead areas in 2003 compared with 35% of all smokers. The difference between the estimated prevalence rate in the Spearhead areas (29.2) and non-Spearhead areas (24.0) is one indicator of the health gap that can be expressed both as an absolute rate gap (5.2) and a relative rate ratio (1.21).

Table 2 summarises national monitoring data about NHS stop smoking services in England, for the period 2003–4 to 2005–6. Column 2 shows the number of smokers setting a quit date, which is the only measure available of those smokers who were treated by the services. Column 3 shows the number of self reported quitters at four-week follow-up. In total, almost 1.5 million smokers were treated in England during the period as a whole. Fifty-five per cent (832 678) of smokers accessing treatment services and setting a quit date self reported that they had quit at short-term follow-up.

Column 4 shows that the cessation rate was lower (52.6% overall) in the Spearhead Group areas than elsewhere (57.9%)

($p<0.001$). On the other hand, column 5 indicates that the proportion of all smokers treated was higher (16.7%) in the more disadvantaged areas than in the remainder of England (13.4%) ($p<0.001$). The net results are shown in columns 6 and 7. Overall, the proportion of all smokers who were estimated to have quit at four-week and 52-week follow up was higher in the Spearhead areas (8.8% and 2.2%) than elsewhere (7.8% and 1.9%) ($p<0.001$).

It is important to note that the statistics shown in table 2 assume that each smoker treated is a unique individual, but this assumption is almost certainly incorrect. An unknown but probably relatively small number of smokers will have undertaken more than one course of treatment during the period under review. To the extent that this is the case, the estimates shown in table 2 will tend to overestimate the impact of services.

Table 3 illustrates the impact of smoking cessation services on some conventional measures of health inequality. The second column of table 3 shows baseline smoking prevalence data for 2003 together with four indicators of inequality; the absolute rate gaps and relative rate ratios (ARG1, RR1) between the Spearhead and non-Spearhead areas, and between the Spearhead Group and England as a whole (ARG2, RR2).

The third column of table 3 uses the data from table 2 to estimate the size of the potential impact of NHS stop smoking services on inequalities. Column 3 makes the assumption—based on a detailed analysis of 52 week CO validated follow-up¹⁴—that 75% of short-term quitters will relapse within less than one year. This implies small reductions in prevalence rates across the board, and a small narrowing of inequalities. For example, it is estimated that the absolute rate gap between Spearhead and non-Spearhead areas was reduced from 5.2 to 5.0, and the relative rate ratio from 1.215 (CIs: 1.216 to 1.213) to 1.212 (CIs: 1.213 to 1.210), between 2003 and 2006.

DISCUSSION

Perhaps the most important finding in this paper is that lower success rates for disadvantaged groups do not necessarily exacerbate inequalities. The social distribution of prevalence rates is only partly a function of the success rate; it also depends on the relative numbers of smokers in different social groups or disadvantaged areas who are treated.

Table 2 NHS stop smoking services, England, 2003–4 to 2005–6

Area	Smokers setting a quit date†	Smokers quit at 4 weeks†	Cessation rate	Treated as % of all smokers	4-week quit as % of all smokers	52-week quit smokers as % of all smokers
	No	No	%	%	%	%
Spearhead	599 361	315 219	52.6	16.7	8.8	2.2
Non-Spearhead	894 247	517 459	57.9	13.4	7.8	1.9
χ^2 (df:1)	—	—	4044	20 127	3226	761
p Value			<0.001	<0.001	<0.001	<0.001

†Derived from statistics on NHS stop smoking services in England.²²⁻²⁴

Table 3 Inequalities in smoking, England, 2003–6

Area	Smoking rate	
	2003 (%)	2006 (%)‡
Spearhead	29.2	28.6
Other	24.0	23.6
England	25.6	25.1
ARG1‡‡	5.2	5.0
ARG2‡‡‡	3.6	3.5
RR1¶	1.215 (Cls: 1.216 to 1.213)	1.212 (Cls: 1.213 to 1.210)
RR2¶¶	1.140 (Cls: 1.141 to 1.138)	1.213 (Cls: 1.139 to 1.136)

‡2003 prevalence rates less cumulative number of 4-week quitters from April 2003 to March 2006, adjusted for 75% relapse rate.

‡‡Absolute rate gap between Spearhead and non-Spearhead areas.

‡‡‡Absolute rate gap between Spearhead and England.

¶Relative rate ratio between Spearhead and non-Spearhead areas.

¶¶Relative rate ratio between Spearhead and England.

This study examined the extent to which NHS stop smoking services were treating smokers in disadvantaged groups and supporting them to quit. Although disadvantaged groups had proportionately lower success rates than their more affluent neighbours, services were treating many more clients in disadvantaged communities. Overall, therefore, the net effect of service intervention was to achieve a greater proportion of quitters among smokers living in the most disadvantaged areas. This is a considerable achievement, particularly given existing research evidence regarding some of the challenges of accessing and supporting disadvantaged populations to change their health behaviours.³³

The findings reported here are consistent with a number of other studies in showing that cessation rates associated with NHS treatment services are lower among more disadvantaged groups. Detailed analyses of the impact of smoking cessation services in the United Kingdom—in places as varied as Cumbria, Glasgow and Nottingham, in different settings such as specialist groups, one to one counselling or community pharmacies, and with different follow-up times and processes—have all found that smokers living in more disadvantaged areas have a higher probability of being more addicted and have lower cessation rates associated with NHS treatment services than those living in less deprived areas.^{14 15 34} However, the results in this paper also support previous studies showing that NHS stop smoking services are particularly successful at reaching smokers living in the most disadvantaged areas.^{16 18–20}

The value of this study is constrained by its reliance on national monitoring data collected by local services and submitted to the Department of Health. The data record a quit attempt (in the form of a quit date set) and the four-week outcome related to a single quit attempt. A person can set a quit date with the services more than once in a year, but this is unusual and therefore the incidence of “double counting” is likely to be small. However, what is unknown is whether any double-counting varies between Spearhead and non-Spearhead areas. Any substantial and systematic variation between the two could account for the observed differences in rates of treatment. In addition, the study estimates one year outcomes based on research evidence regarding the expected rate of relapse between four weeks and one year. We know from other studies that relapse can continue beyond one year.³⁵

It is also possible that relapse rates vary by areas in relation to the level of disadvantage. However, the existing evidence does not support this. Outcomes data from the national evaluation of smoking cessation show that relapse rates are almost identical in contrasting areas.^{14 15}

Another point worth noting is that the study is limited to NHS stop smoking services and therefore does not include the large number of smokers who quit without formal support or who stop following brief advice from their GP or other health professional and use of appropriate pharmacotherapies.³⁶ Insofar as these efforts might have a greater impact in non-Spearhead areas then they would tend to exacerbate inequalities in smoking rates and increase the size of the equity dimension of the task facing NHS stop smoking services. Indeed, other studies have found that health promotion interventions can increase, rather than decrease, inequalities in health.³⁷

Despite the emerging evidence of modest effectiveness outlined in our analysis, the impact of NHS stop smoking services on reducing inequalities in smoking prevalence is likely to be small. In part, of course, this is because NHS services can do nothing to change the social circumstances of smokers that give rise to and perpetuate inequalities. Nevertheless, it is worth asking what more can be done. Firstly, in order to maximise the potential contribution of NHS stop smoking services, added investment is required to continue to allow services to expand, particularly in communities where smoking prevalence rates are highest. More resources would permit services to treat larger numbers of smokers and would also allow them to operate in a wider range of settings (including, importantly, community pharmacies), maximising their accessibility to smokers.^{38 39} It is also possible that some smokers may benefit from more intensive interventions in terms of more frequent contact with trained advisers or additional pharmacotherapy, but more evidence is required. More innovative approaches, in particular in relation to relapse prevention, are also needed if outcomes are to improve.

Secondly, and perhaps more importantly, services should be seen as just one part of a broader tobacco control strategy at national and local level. Most smokers do not come into contact with NHS cessation services, but they can be reached by other, wider tobacco control policies. These include banning smoking in public places and reducing exposure to secondhand smoke; reducing tobacco promotion through the implementation of the Tobacco Advertising Act 2002; communications and education, with continued investment in hard-hitting advertising campaigns; tobacco regulation, including picture warnings on cigarette packets; raising tobacco taxes by more than the rate of inflation; and continuing attempts to reduce the availability

What this paper adds

- This paper examines whether a newly introduced national system of smoking cessation services in England can contribute to a reduction in inequalities in smoking prevalence.
- Although quit rates are lower among more disadvantaged groups this is offset by substantial positive discrimination towards such groups in the delivery of services.
- The net effect of new services is to achieve a modest reduction in inequalities.
- This is a rare and substantial achievement but it is not enough on its own to meet government targets for reducing social inequalities in smoking.
- In particular, wider aspects of tobacco control policy need to demonstrate that they are making an effective contribution to reducing inequalities.

and supply of tobacco, with new strategies being put in place to reduce smuggling. Many of the measures already under way, such as banning smoking in public places, have significant potential to reduce smoking prevalence over time. What the actual impact will be on reducing inequalities between social groups and over what timescale, however, is still unknown.

CONCLUSION

The findings presented here outline new evidence of progress in addressing the health divide caused by smoking. They suggest that NHS stop smoking services may have a potentially important role to play in reducing inequalities, especially if they can be modified to take more effective account of the level of addiction and other adverse circumstances associated with smokers living in the most disadvantaged areas. However, most smokers who attempt to quit do so without accessing these services, and therefore substantial progress towards meeting government targets will probably be dependent on wider aspects of tobacco policies for which there is as yet virtually no evidence about their likely impact on inequalities.

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